

Atty. Docket No. PPW06-560DS (OPPO31047US)
Application No: 10/751,172

Amendments to the Claims

Please amend the claims as shown below. This listing of Claims replaces all prior versions and listings of the Claims in this application.

Listing of Claims

1. (Currently Amended) A method of manufacturing silicide, comprising the steps of:

(a) cleaning a semiconductor substrate with a transistor formed thereon, the transistor including a source electrode, a drain electrode and a gate electrode;

(b) placing the cleaned semiconductor substrate into a sputter chamber in a deposition equipment, and heating the semiconductor substrate to a temperature of from greater than 450 to 600°C;

(c) initially forming a monosilicide at the same time as depositing sputtering a metal film at a DC power of 2 – 10kW under a state where the semiconductor substrate is heated at the temperature of from greater than 450 to 600°C;

(d) removing residual metal film not used for the formation of silicide; and

(e) annealing the semiconductor substrate.

2. (Previously presented) The method of claim 1, wherein, in the step (c), the monosilicide comprises CoSi.

3. (Previously presented) The method of claim 2, wherein the step (a) includes a first cleaning step comprising cleaning the semiconductor substrate with SC1 solution.

Atty. Docket No. PPW06-S60DS (OPP031047US)
Application No: 10/751,172

4. (Previously presented) The method of claim 3, wherein the step (a) further includes a second cleaning step comprising cleaning the semiconductor substrate with HF or DHF (dilute HF) solution.

5. (Previously presented) The method of claim 1, wherein the step (a) includes plasma cleaning the semiconductor substrate in the sputter chamber.

6. (Previously presented) The method of claim 5, wherein the cleaning step includes a first etching step at an RF power of 60 – 90W and a second etching step at an RF power of 250 – 350W.

7. (Previously presented) The method of claim 5, wherein said plasma comprises argon gas of 3 – 8 sccm.

8. (Cancelled)

9. (Currently amended) The method of claim 1, wherein the step (c) comprises sputtering cobalt at a DC power of ~~2~~ – 10kW.

10. (Previously presented) The method of claim 1, wherein the step (c) comprises sputtering the metal film using argon gas of 40 – 70 sccm, and heating the semiconductor substrate using argon gas of 8 – 15 sccm.

11. (Previously presented) The method of claim 2, wherein the step (d) includes a first removal step comprising removing the metal film for 5 – 15 minutes in SPM solution at a temperature of 50 - 150°C and a second removal step comprising removing the metal film for 3 – 10 minutes in SC1 solution at a temperature of 40 - 70°C.

Atty. Docket No. PPW06-560DS (OPPO31047US)
Application No: 10/751,172

12. (Previously presented) The method of claim 2, wherein the step (c) includes heating the semiconductor substrate for 10 – 60 seconds at a temperature of 700 – 950°C in a RTP equipment.

13. (Previously presented) The method of claim 2, wherein the step (c) includes heating the semiconductor substrate for 20 – 60 minutes at a temperature of 500 - 900°C in an electric furnace.

14. (Previously presented) The method of claim 2, wherein, after the step (e) the silicide comprises CoSi_2 .

15-16. (Cancelled)

17. (Currently Amended) A method of manufacturing silicide, comprising the steps of:

(a) cleaning a semiconductor substrate with a transistor thereon, the transistor including a source electrode, a drain electrode and a gate electrode;

(b) placing the cleaned semiconductor substrate into a sputter chamber and sputtering a metal film at a DC power of 2 – 10kW, while heating the semiconductor substrate at a temperature of 450 to 600°C to form a silicide having a 1:1 metal:silicon ratio;

(c) removing residual metal film; and

(d) annealing the semiconductor substrate.

18. (Previously presented) The method of claim 17, wherein the silicide comprises CoSi .

19. (Previously presented) The method of claim 17, wherein step (b) comprises sputtering the metal film using argon gas of 40 – 70 sccm, and heating the semiconductor substrate using argon gas of 8 – 15 sccm.

Atty. Docket No. PPW06-560DS (OPP031047US)
Application No: 10/751,172

20. (Previously presented) The method of claim 17, wherein the step (c) includes a first removal step comprising removing the metal film for 5 – 15 minutes in SPM solution at a temperature of 50 - 150°C and a second removal step comprising removing the metal film for 3 – 10 minutes in SC1 solution at a temperature of 40 - 70°C.

21. (Previously presented) The method of claim 18, wherein the step (d) includes rapid thermal processing the semiconductor substrate for 10 – 60 seconds at a temperature of 700 - 950°C.

22. (Previously presented) The method of claim 18, wherein the step (d) includes heating the semiconductor substrate for 20 – 60 minutes at a temperature of 500 - 900°C in an electric furnace.

23. (Previously presented) The method of claim 18, wherein after the step (d) the silicide comprises CoSi₂.